CLAIMS

What is claimed is:

1. A countermeasure ("CM") system for the defense of aircraft against missile attack, said system comprising:

a dispenser mounted on an aircraft and configured to dispense a substance into an area within an attack envelope of said aircraft, said substance emitting radiation in a first wavelength band when excited by incident radiation in a second wavelength band; and

at least one exciter configured to generate illuminating radiation in said second wavelength band, and to direct said illuminating radiation toward said area.

2. A CM system according to claim 1, wherein:

said at least one exciter is configured to generate said illuminating radiation in response to the determination of a missile attack within said attack envelope of said aircraft; and

said dispenser is configured to dispense said substance in response to the determination of said missile attack.

3. A CM system according to claim 1, wherein said substance comprises nanocrystals.

4. A CM system according to claim 1, wherein said substance emits infrared radiation when excited by said incident radiation.

5. A CM system according to claim 1, wherein the wavelength of said incident radiation is shorter than the wavelength of radiation emitted by said substance.

6. A CM system according to claim 1, wherein the wavelength of radiation emitted by said substance approximates the wavelength of emissions produced by engine exhaust of said aircraft.

7. A CM system according to claim 1, wherein said at least one exciter is ground-based.

8. A CM system according to claim 1, wherein said at least one exciter comprises at least one laser emitter.

9. A CM system according to claim 8, wherein said at least one laser emitter tracks said aircraft within said attack envelope of said aircraft.

10. A CM system according to claim 8, wherein said at least one laser emitter tracks said aircraft on approach/departure.

11. A CM system according to claim 1, further comprising at least one detector configured to detect events indicative of the presence of a missile within said attack envelope of said aircraft.

12. A CM system according to claim 11, wherein said at least one detector comprises at least one Doppler-sensitive radar.

13. A CM system according to claim 11, wherein said at least one detector comprises at least one visual imaging element.

14. A CM system according to claim 11, wherein said at least one detector comprises at least one infrared imaging element.

15. A CM system according to claim 11, further comprising an engagement control subsystem in communication with said at least one detector, with

said at least one exciter, and with said dispenser, said engagement control subsystem being configured to analyze data corresponding to said events to determine whether a missile is present within said attack envelope, to control said at least one exciter, and to control said dispenser.

16. A CM system according to claim 15, wherein said engagement control subsystem is configured to activate said at least one exciter in response to the determination of said missile attack.

17. A CM system according to claim 15, wherein said engagement control subsystem is configured to control tracking of said at least one exciter relative to said aircraft.

18. A CM system according to claim 15, wherein:

said engagement control subsystem comprises a transmitter configured to transmit an engagement signal in response to the determination of said missile attack; and

said dispenser is configured to dispense said substance upon receipt of said engagement signal.

19. A CM system according to claim 18, further comprising an engagement signal receiver mounted on said aircraft, said engagement signal receiver being configured to receive said engagement signal.

20. A CM system according to claim 19, wherein said dispenser includes said engagement signal receiver.

21. A countermeasure ("CM") method for the defense of aircraft against missile attack, said method comprising:

dispensing an aerosol of a substance into a region proximate an aircraft in response to the determination of a missile attack within an attack envelope of said aircraft, said substance emitting radiation in a first wavelength band when excited by incident radiation in a second wavelength band; and

illuminating said region with radiation in said second wavelength band.

22. A CM method according to claim 21, wherein said illuminating step is performed in response to the determination of said missile attack within said attack envelope of said aircraft.

23. A CM method according to claim 21, further comprising:

detecting events indicative of the presence of a missile within said attack envelope of said aircraft; and

determining, in response to said detecting step, the presence of a missile within said attack envelope of said aircraft.

24. A CM method according to claim 21, further comprising transmitting an engagement signal in response to the determination of said missile attack within said attack envelope of said aircraft, wherein said dispensing step is performed in response to the transmission of said engagement signal.

25. A countermeasure ("CM") subsystem for the defense of aircraft against missile attack, said subsystem comprising:

a controller configured to receive an engagement signal indicative of the presence of a missile within an attack envelope of an aircraft; and

an exciter connected to said controller, said exciter being configured to generate, in response to said engagement signal, an excitation signal and to direct said excitation signal at an area, proximate said aircraft, that contains a substance dispensed in response to the presence of said missile within said attack envelope of said aircraft; wherein

said excitation signal has properties that cause said substance to emit radiation having characteristics that approximate characteristics of engine exhaust of said aircraft.

26. A CM subsystem according to claim 25, wherein:

said substance emits radiation in a first wavelength band when excited by incident radiation in a second wavelength band; and

said excitation signal comprises radiation in said second wavelength band.

27. A CM subsystem according to claim 26, wherein the wavelength of said excitation signal is shorter than the wavelength of radiation emitted by said substance.

28. A CM subsystem according to claim 25, wherein said exciter is ground-based.

29. A CM subsystem according to claim 25, wherein said exciter comprises at least one laser emitter.

30. A CM subsystem according to claim 29, wherein said controller causes said at least one laser emitter to track said aircraft within said attack envelope of said aircraft.

31. A CM subsystem according to claim 29, wherein said controller causes said at least one laser emitter to track said aircraft on approach/departure.

32. A countermeasure ("CM") method for the defense of aircraft against missile attack, said method comprising:

receiving an engagement signal indicative of the presence of a missile within an attack envelope of an aircraft;

generating, in response to said engagement signal, an excitation signal; and

directing said excitation signal at an area, proximate said aircraft, that contains a substance dispensed in response to the presence of said missile within said attack envelope of said aircraft; wherein

said excitation signal has properties that cause said substance to emit radiation having characteristics that approximate characteristics of engine exhaust of said aircraft.

33. A CM method according to claim 32, further comprising tracking said aircraft with said excitation signal.

34. A countermeasure ("CM") subsystem for the defense of aircraft against missile attack, said subsystem comprising:

a receiver configured to receive an engagement signal indicative of the presence of a missile within an attack envelope of an aircraft; and

a dispenser mounted on said aircraft and configured to dispense a substance in response to said engagement signal, said substance emitting radiation in a first wavelength band when excited by incident radiation in a second wavelength band.

35. A CM subsystem according to claim 34, wherein said substance comprises nanocrystals.

36. A CM subsystem according to claim 34, wherein said substance emits infrared radiation when excited by said incident radiation.

37. A CM subsystem according to claim 34, wherein the wavelength of said incident radiation is shorter than the wavelength of radiation emitted by said substance.

38. A CM subsystem according to claim 34, wherein the wavelength of radiation emitted by said substance approximates the wavelength of emissions produced by engine exhaust of said aircraft.

39. A CM subsystem according to claim 34, wherein said receiver is integrated with said dispenser.

40. A countermeasure ("CM") method for the defense of aircraft against missile attack, said method comprising:

receiving, at an aircraft, an engagement signal indicative of the presence of a missile within an attack envelope of said aircraft; and

dispensing a substance from said aircraft in response to said engagement signal, said substance emitting radiation in a first wavelength band when excited by incident radiation in a second wavelength band.

41. A CM method according to claim 40, wherein said receiving step receives said engagement signal in a coded form.

42. An engagement control subsystem for the defense of aircraft against missile attack, said engagement control subsystem comprising:

a receiver configured to receive sensor data indicative of the presence of a missile within an attack envelope of an aircraft; and

a first control architecture configured to generate, in response to said sensor data, a first engagement signal for controlling at least one exciter, said at least one exciter being configured to generate an excitation signal and to direct said excitation signal at an area that contains a substance dispensed from said aircraft; wherein

said excitation signal has properties that cause said substance to emit radiation having characteristics that approximate characteristics of engine exhaust of said aircraft.

43. An engagement control subsystem according to claim 42, further comprising a second control architecture configured to generate, in response to said sensor data, a second engagement signal for controlling the dispensing of said substance from said aircraft.

44. An engagement control subsystem according to claim 43, wherein said second control architecture is further configured to generate said second engagement signal in a coded form.

45. An engagement control subsystem according to claim 42, wherein said substance emits radiation in a first wavelength band when excited by incident radiation in a second wavelength band; and

said excitation signal comprises radiation in said second wavelength band.

46. An engagement control subsystem according to claim 42, further comprising a processor configured to analyze said sensor data to determine whether a missile is present within said attack envelope.

47. An engagement control subsystem according to claim 42, wherein said first control architecture is further configured to cause said at least one exciter to track said aircraft within said attack envelope of said aircraft.

48. An engagement control subsystem according to claim 42, wherein said first control architecture is further configured to cause said at least one exciter to track said aircraft on approach/departure.

49. A countermeasure ("CM") method for the defense of aircraft against missile attack, said method comprising:

receiving sensor data indicative of the presence of a missile within an attack envelope of an aircraft; and

generating, in response to said sensor data, a first engagement signal for controlling at least one exciter, said at least one exciter being configured to generate an excitation signal and to direct said excitation signal at an area that contains a substance dispensed from said aircraft; wherein

said excitation signal has properties that cause said substance to emit radiation having characteristics that approximate characteristics of engine exhaust of said aircraft.

50. A CM method according to claim 49, further comprising generating, in response to said sensor data, a second engagement signal for controlling the dispensing of said substance from said aircraft.

51. A CM method according to claim 50, wherein said second engagement signal comprises a coded signal.

52. A CM method according to claim 49, further comprising processing said sensor data to determine whether a missile is present within said attack envelope.

53. A CM method according to claim 49, further comprising controlling said at least one exciter to track said aircraft within said attack envelope of said aircraft.

54. A CM method according to claim 49, further comprising controlling said at least one exciter to track said aircraft on approach/departure.